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Organisation Mondiale de la Propriété Intellectuelle (OMPI) - Genève, Suisse

1278671

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

January 27, 2005

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APPLICATION NUMBER: 60/533,136

FILING DATE: *December 30, 2003*

RELATED PCT APPLICATION NUMBER: *PCT/US04/44050*



Certified by

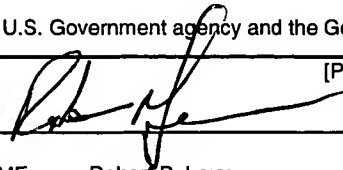
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PROVISIONAL APPLICATION FOR PATENT COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53 (c).

INVENTOR(S)					
Given Name (first and middle [if any])		Family Name or Surname		Residence (City and either State or Foreign Country)	
Yousef Wasef		Nijim		Carmel, Indiana	
Charles Bryan		Hunt		Westfield, Indiana	
<input checked="" type="checkbox"/> Additional inventors are being named on the _____ separately numbered sheets attached hereto					
TITLE OF THE INVENTION (500 characters max)					
EDGE BLENDING OF MULTIPLE DLP PROJECTORS USING COSINE FUNCTION					
Direct all correspondence to: CORRESPONDENCE ADDRESS					
<input type="checkbox"/> Customer Number _____					
OR					
<input checked="" type="checkbox"/> Firm or Individual Name		JOSEPH S. TRIPOLI, THOMSON LICENSING INC.			
Address		PATENT OPERATIONS			
Address		P. O. BOX 5312			
City		PRINCETON	State	NJ	ZIP 08543-5312
Country		USA	Telephone	609 - 734-6834	Fax 609 - 734-6888
ENCLOSED APPLICATION PARTS (check all that apply)					
<input checked="" type="checkbox"/> Specification Number of Pages 3 <input type="checkbox"/> CD(s), Number _____					
<input type="checkbox"/> Drawing(s) Number of Sheets _____ <input type="checkbox"/> Other (specify) _____					
<input type="checkbox"/> Application Data Sheet. See 37 CFR 1.76					
METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT					
<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27.					
<input type="checkbox"/> A check or money order is enclosed to cover the filing fees					
<input checked="" type="checkbox"/> The Director is hereby authorized to charge filing fees or credit any overpayment to Deposit Account Number: 07-0832					
<input type="checkbox"/> Payment by credit card. Form PTO-2038 is attached.					
FILING FEE AMOUNT (\$) 160.00					
The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.					
<input type="checkbox"/> No.					
<input type="checkbox"/> Yes, the name of the U.S. Government agency and the Government contract number are: _____					

Respectfully submitted,
SIGNATURE

[Page 1 of 2]

Date Dec. 30, 2003

TYPED or PRINTED NAME Robert B. Levy

REGISTRATION NO. 28,234
(if appropriate)

TELEPHONE 609/734-6820

Docket Number: PU030336

USE ONLY FOR FILING A PROVISIONAL APPLICATION FOR PATENT

This collection of information is required by 37 CFR 1.51. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 8 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Mail Stop Provisional Application, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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031356 U.S. PTO
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Docket Number **PU030336**


[Page 2 of 2]

Number 2 of 2

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FEE TRANSMITTAL for FY 2004 <i>Effective 10/01/2003. Patent fees are subject to annual revision.</i> <input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27		Complete if Known	
		Application Number	
		Filing Date	December 30, 2003
		First Named Inventor	Yousef Wasef Nijim
		Examiner Name	
		Art Unit	
TOTAL AMOUNT OF PAYMENT (\$) 160		Attorney Docket No.	PU030336

METHOD OF PAYMENT (check all that apply)		FEE CALCULATION (continued)																																																																																																																																																																																															
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SUBMITTED BY		Complete (if applicable)			
Name (Print/Type)	Robert B. Lewy	Registration No. (Attorney/Agent)	28,234	Telephone	609/734-6820
Signature		Date	Dec. 30, 2003		

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PROVISIONAL PATENT APPLICATION
ATTORNEY DOCKET PU030336

Edge Blending of Multiple DLP Projectors Using Cosine Function

The purpose of this is to displaying higher resolution image using multiple projectors. The displayed image is tiled together seamlessly using the algorithm being developed to generate an S-curve instead of the linear algorithm that has been widely used. With the S-curve the transition from one projector to the other one will be slower than a linear curve.

This invention will seam different segments of an image together seamlessly. In this algorithm the slope is slower than the linear case. Also, the transition from the output of one projector is slower than that of the second projector. This will make the seamed area better. Figure 1 and 2 defined the setup of the tiled projectors.

The widely used algorithm is using linear algorithm for the brightness. It starts with one value at one edge of projector one, up to zero to the other end of the second projector. This is shown in Figure 3.

The abrupt change in intensity is feasible in the seamed area. To transform smoothly from one projector to the other, we developed this algorithm. The algorithm is a quadratic curve, developed using the cosine function.

$$x1 = (0.5 \times \cosine(\frac{PI \times j}{overlap}) + .5)^{1/\gamma} \quad (1)$$

$$x2 = (1 - (0.5 \times \cosine(\frac{PI \times j}{overlap}) + .5))^{1/\gamma} \quad (2)$$

Where the overlap is the seaming area in number of pixels, j is the pixels range from 1:overlap, and gamma is the gamma correction function. Equation 1 is the value of the overlapped area of projector 1, while equation 2 is the value of the overlapped pixel of projector 2.

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Equation 1 is applied to the input image before it is displayed or processed in the DLP projector1 as

$$\text{Overlaped_pixel_from_projector1} = \text{Pixel_value} * x1 \quad (3)$$

The 2nd projector input image is processed the inverse of the equation 1 (i.e. equation 2). However, the total sum of the both projectors output added together is one. When adding to one for the S-curve would generate the desired pixel value, which will show as if the output is from one projector. The function gradually transition from one to zero, and the other projector from zero to one. Each projector's pixel input is multiplied by the smoothing function. The gradual level depends on the curve used and the slop of the curve. In general it is gradual transition one bit at a time.

The gamma correction of each projector is applied to the smoothing curve before it is applied to the input signal

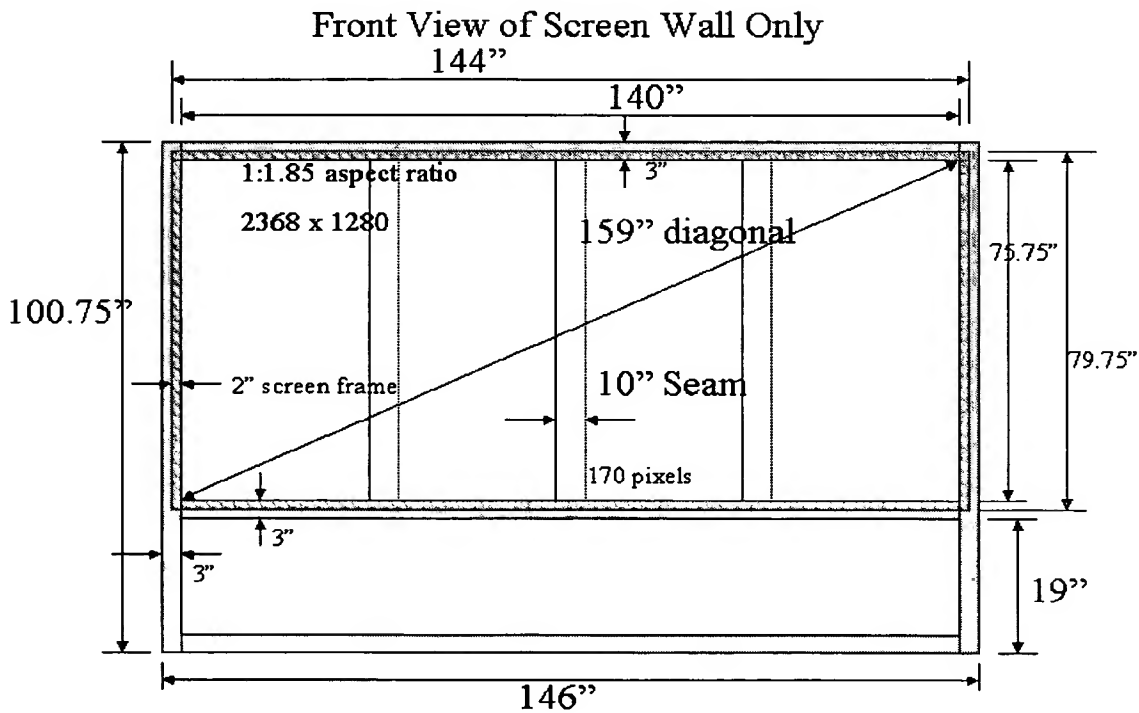


Figure 1

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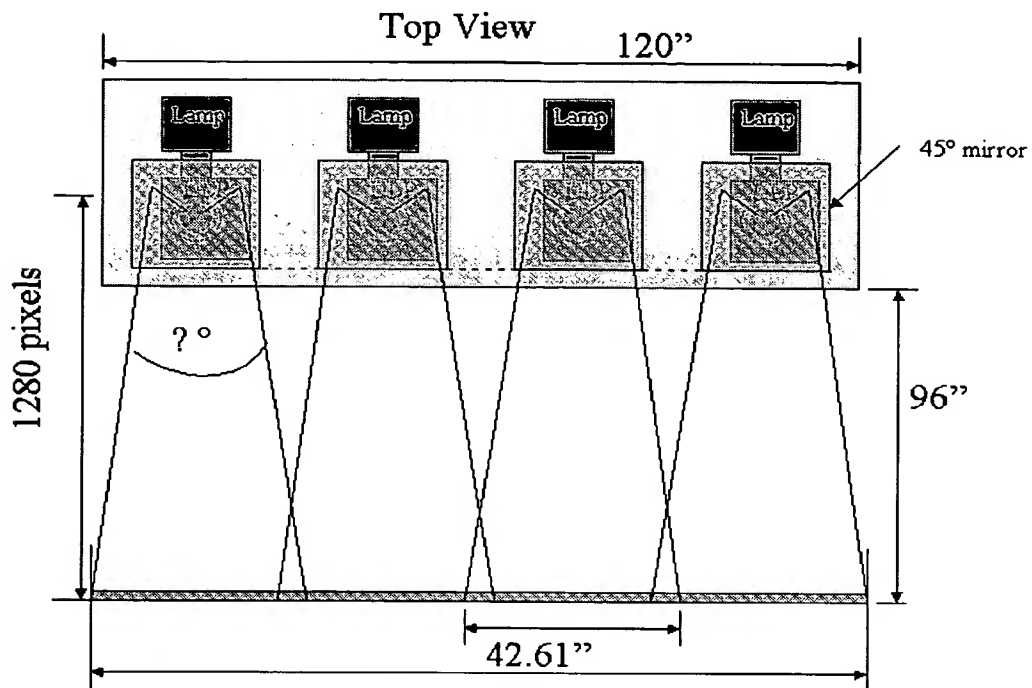
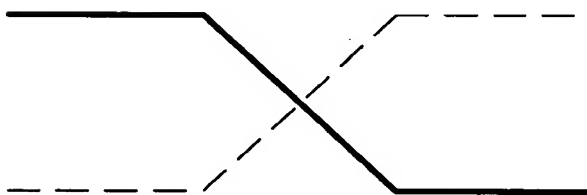


Figure 2



Linear operation
 — — — Projector One
 — — — Projector Two



Cosine Operation
 — — — Projector One
 — — — Projector Two

Figure 3: The seaming algorithms